



14 13

Figure 1

SEQ ID No.	GID	coding sequence coordinates	conserved domain in amino acid coordinates
1	G188	50..1096	175-222
2	G616	129..1211	39-95
3	G19	70..816	76-145
4	G261	458..1663	16-104
5	G28	63..869	145-213
6	G869	428..1402	109-177
7	G237	1..852	11-113
8	G409	331..1149	64-124
9	G418	103..2322	500-560
10	G591	88..1020	143-240
11	G525	109..966	23-167
12	G545	55..738	82-102, 136-154
13	G865	282..920	36-103
14	G881	76..1008	176-233
15	G896	47..1150	18-39
16	G378	1..726	196-237
17	G569	184..969	90-153
18	G558	267..1259	45-105
19	G22	81..761	89-157
20	G225	157..441	39-76
21	G226	10..348	28-78
22	G256	312..1310	13-115
23	G419	381..2213	392-452
24	G464	41..664	7-15,70-80,125-158,183-219
25	G482	188..760	25-116
26	G502	224..1093	10-155
27	G526	181..1188	21-149
28	G561	86..1168	248-308
29	G664	104..952	13-116
30	G682	1..228	22-53
31	G911	1..480	86-129
32	G964	162..1013	126-186
33	G394	82..918	121-182
34	G489	33..695	57-156
35	G214	238..2064	22-71
36	G229	41..1156	14-120
37	G241	46..867	14-114
38	G663	113..862	9-111
39	G776	76..1431	27-175
40	G778	50..1249	220-267
41	G883	67..1041	245-302
42	G938	1..1755	96-104
43	G1328	67..1041	14-119
44	G584	40..1809	401-494
45	G668	1..1056	13-113
46	G727	43..1977	226-269

47	G732	73..588	31-91
48	G9	81..1139	62-127
49	G428	97..1032	229-292
50	G1269	88..951	27-83
51	G1038	240..1574	198-247
52	G438	188..2716	22-85
53	G571	326..1708	160-220
54	G748	98..1444	112-140
55	G431	1..1149	286-335
56	G187	118..1074	172-228
57	G470	1..2580	61-393
58	G615	197..1252	88-147
59	G1073	62..874	33-42, 78-175
60	G26	73..729	67-134
61	G38	149..1156	76-143
62	G43	38..643	104-172
63	G207	16..930	6-106
64	G254	15..923	62-106
65	G263	48..902	15-105
66	G308	196..1794	270-274
67	G536	1..768	226-233
68	G680	338..2275	24-70
69	G867	64..1098	59-124
70	G912	20..694	51-118
71	G996	53..1063	14-114
72	G1068	150..1310	143-150
73	G1337	97..1398	9-75
74	G231	88..888	14-118
75	G274	172..2037	108-572
76	G307	1..1764	323-339
77	G346	1..825	196-221
78	G598	248..1039	205-263
79	G605	72..1076	132-143
80	G777	54..914	47-101
81	G1133	104..1084	256-326
82	G1266	62..718	79-147
83	G1324	54..914	20-118
84	G975	58..657	4-71
85	G157	31..621	2-57
86	G859	132..569	2-57
87	G1842	219..809	2-57
88	G1843	51..653	2-57
89	G1844	39..635	2-57
90	G861	158..880	2-57
91	G192	63..959	128-185
92	G234	106..1035	14-115
93	G361	54..647	43-63
94	G486	1..420	5-66
95	G994	180..917	14-123
96	G1335	56..667	24-43, 131-144, 185-203
97	G562	137..1285	253-315

98	G736	1..513	54-111
99	G1435	8..904	146-194
100	G180	54..629	118-174
101	G592	121..1200	290-342
102	G208	15..725	14-116
103	G658	17..757	2-105
104	G1334	76..885	18-190
105	G27	83..622	37-104
106	G740	25..924	24-42, 232-268
107	G559	89..1285	203-264
108	G1093	1..531	105-148
109	G725	46..1122	39-87



**Figure 2**

SEQ ID No.	GID	Overexpressor (OE) or knockout (KO)	Phenotypic observations
1	G188	KO	Increased susceptibility to Fusarium, better germination under osmotic stress
2	G616	OE	Increased tolerance to Erysiphe
3	G19	OE	Increased tolerance to Erysiphe
4	G261	OE	Increased susceptibility to Botrytis
5	G28	OE	Increased resistance to Erysiphe
6	G869	OE	Increased susceptibility to Fusarium. Up to 35% alteration in some seed fatty acids, including 29% decrease in 16:0, 35% decrease in 18:0, 24% increase in 18:1, 26% increase in 18:2, 25% decrease in 20:0 and 26% decrease in 18:3. Undeveloped, small anthers. Alteration in leaf fatty acids eg up to 39% decrease in 16:0 fatty acid; up to 43% increase in fucose.
7	G237	OE	Increased tolerance to Erysiphe
8	G409	OE	Increased tolerance to Erysiphe
9	G418	OE	Increased tolerance to Pseudomonas
10	G591	OE	Increased tolerance to Erysiphe; alterations in flowering time
11	G525	OE	Increased tolerance to Pseudomonas
12	G545	OE	Increased susceptibility to Pseudomonas, Erysiphe and Fusarium. Susceptible to high salt
13	G865	OE	Increased susceptibility to Erysiphe and Botrytis; Up to 39% increase seed protein; 23% increase in seed oil; early flowering and bushy, with very thin and spindly bolts.
14	G881	OE	Increased susceptibility to Erysiphe and Botrytis
15	G896	KO	Increased susceptibility to Fusarium
16	G378	OE	Increased resistance to Erysiphe
17	G569	OE	Decreased expression of defense genes
18	G558	OE	Increased expression of defense genes
19	G22	OE	Increased tolerance to high salt
20	G225	OE	Increased tolerance to nitrogen-limited medium
21	G226	OE	Increased tolerance to nitrogen-limited medium and up to 17% increase in seed protein content
22	G256	OE	Better germination and growth in cold
23	G419	OE	Increased tolerance to potassium-free medium
24	G464	OE	Better germination and growth in heat. Up to 12% decrease in seed oil and up to 25% increase in seed protein
25	G482	OE	Increased tolerance to high salt
26	G502	KO	Increased sensitivity to osmotic stress
27	G526	OE	Increased sensitivity to osmotic stress



Figure 2

28	G561	OE	Increased tolerance to potassium-free medium
29	G664	OE	Better germination and growth in cold
30	G682	OE	Better germination and growth in heat
31	G911	OE	Increased growth on potassium-free medium
32	G964	OE	Better germination and growth in heat
33	G394	OE	More sensitive to chilling
34	G489	OE	Increased tolerance to osmotic stress
35	G214	OE	Up to 111% increase in seed lutein. Increase in leaf fatty acids, for example 100% increase in 18:0 fatty acid. Also up to 100% increase in leaf chlorophyll and 100% increase in leaf carotenoids. Alterations in flowering time
36	G229	OE	Up to 11% increase in seed oil and up to 13% decrease in seed protein
37	G241	OE	Up to 13% decrease in seed oil; decreased germination and growth on glucose medium
38	G663	OE	Up to 16% decrease in seed oil and up to 14% increase in seed protein
39	G776	OE	Up to 35% alteration in some seed fatty acids, including 31% decrease in 16:0, 31% increase in 18:0, 23% increase in 18:2, 26% increase in 20:0, 20% decrease in 18:3, 31% increase in 20:2 and 35% decrease in 22:1.
40	G778	OE	Up to 32% increase in seed 18:1 fatty acid
41	G883	OE	Up to 47% decrease in seed lutein
42	G938	OE	Up to 115% increase in some seed fatty acids, including 115% increase in 16:0, 106% increase in 18:0, 36% decrease in 18:2, 69% increase in 20:0, 35% increase in 18:3, 21% decrease in 20:1, 52% decrease in 20:2 and 46% decrease in 22:1.
43	G1328	OE	Up to 43% decrease in seed lutein
44	G584	OE	Larger seeds
45	G668	OE	Reduced seed color
46	G727	OE	Plants were small, and more dark green in color, late flowering and poorly fertile.
47	G732	OE	Plants were small and inflorescence was unelongated. Flowers parts appeared to be un-elongated and the plants were semi-sterile.
48	G9	OE	Increased root mass
49	G428	OE	Lobed and highly serrated leaves and abnormal first and second whorl floral organs
50	G1269	OE	Extended petioles and leaves pointed upwards
51	G1038	OE	Altered leaf shape
52	G438	KO	Reduced lignin in stem
53	G571	KO	Delayed senescence at the end of the plant lifecycle. Alterations in flowering time



**Figure 2**

54	G748	OE	More vascular bundles in stem. Alterations of flowering time
55	G431	OE	Severe developmental abnormalities such as altered branching, twisted rosette leaves, flowers with missing pistils, fused stamens and atypical numbers of petals and stamens, reduced secondary bolts, and lack of cauline leaves.
56	G187	OE	Plants had long, thin cotyledons and reduced apical dominance. Several flower abnormalities, including underdeveloped, sepaled petals and underdeveloped anthers were also observed.
57	G470	OE	Plants were sterile due to failure of anthers to elongate
58	G615	OE	Plants were sterile due to failure of anthers to develop and failure of stamens to elongate. Fused cotyledons and absence of a shoot apical meristem and true leaves was also observed.
59	G1073	OE	Increased plant size and serrated leaves. Alterations of flowering time.
60	G26	OE	Decreased germination and growth on glucose medium
61	G38	OE	Reduced germination on glucose medium
62	G43	OE	Decreased germination and growth on glucose medium
63	G207	OE	Decreased germination on glucose medium
64	G254	OE	Decreased germination and growth on glucose medium
65	G263	OE	Decreased root growth on sucrose medium
66	G308	OE	No germination on glucose medium
67	G536	OE	Decreased germination and growth on glucose medium
68	G680	OE	Reduced germination on glucose medium; late flowering
69	G867	OE	Better seedling vigor on sucrose medium
70	G912	OE	Reduced cotyledon expansion in glucose
71	G996	OE	Reduced germination on glucose medium
72	G1068	OE	Reduced cotyledon expansion in glucose
73	G1337	OE	Decreased germination on sucrose medium. Alteration in leaf fatty acids, for example up to 28% increase in 18:1 fatty acid.
74	G231	OE	Up to 5% increase in leaf 18:3 fatty acid
75	G274	OE	Up to 50% increase in leaf arabinose
76	G307	OE	Altered in leaf insoluble sugars, for example up to 44% decrease in mannose.
77	G346	OE	Altered leaf fatty acids, for example 25% increase in 16:3 and altered insoluble sugars, for example up to 25% increase in fucose
78	G598	OE	Altered in insoluble sugars, for example up to 20% decrease in rhamnose and up to 10% increase in galactose
79	G605	OE	Altered in leaf fatty acids, for example up to 20% increase in 16:1 fatty acid.
80	G777	OE	Altered in insoluble sugars, for example up to 60% increase in leaf rhamnose
81	G1133	OE	Up to 34% decrease in leaf lutein



**Figure 2**

82			Alteration in leaf fatty acids, for example up to 50% increase in 18:0 fatty acid. Alterations in leaf insoluble sugars, for example a 45% decrease in rhamnose. Altered development: small, dark green with narrow leaves. Poorly fertile, due to due to petals that won't open and ovules appear to be severely underdeveloped.
83	G1324	OE	Up to 65% decrease in leaf lutein and up to 84% increase in leaf xanthophyll
84	G975	OE	Up to 13-fold increase in wax in leaves
85	G157	OE	alterations of flowering time
86	G859	OE	alterations of flowering time
87	G1842	OE	alterations of flowering time
88	G1843	OE	alterations of flowering time
89	G1844	OE	alterations of flowering time
90	G861	OE	alterations of flowering time
91	G192	OE	alterations of flowering time
92	G234	OE	alterations of flowering time
93	G361	OE	alterations of flowering time
94	G486	OE	alterations of flowering time
95	G994	OE	alterations of flowering time
96	G1335	OE	alterations of flowering time
97	G562	OE	alterations of flowering time
98	G736	OE	alterations of flowering time
99	G1435	OE	alterations of flowering time
100	G180	OE	alterations of flowering time
101	G592	OE	alterations of flowering time
102	G208	OE	alterations of flowering time
103	G658	OE	altered development, such as infertility due to undeveloped anthers, small, and upward curled leaves
104	G1334	OE	small and dark green
105	G27	OE	small, dark green in color, bushy, and late flowering with delayed senescence
106	G740	OE	small, slower growing, late flowering and darker green
107	G559	OE	reduced apical dominance and poorly fertile
108	G1093	OE	leaves of G1093 are shorter, rounder, and darker green and some plants are extremely stunted, compact and sterile
109	G725	OE	seedling lethality